This volume is a most valuable contribution to our science, and in the highest degree creditable to its author, for the carefulness and industry he has displayed in his investigation and his great caution in drawing conclusions.

H. C. W., Jr.

Art. XXIII.—*Germ Theory of Disease.*

1. *Disease Germs; their Supposed Nature; an Original Investigation, with Critical Remarks.* By Lionel S. Beale, M.B., F.R.S., Fellow of Royal College of Physicians; Physician to King's College Hospital, etc. etc. 12mo. pp. 82. Philadelphia: Lindsay & Blakiston.
2. "*On the Real Nature of Disease Germs.*" By Lionel S. Beale, F.R.S., etc., in "The Monthly Microscopical Journal" for October, 1870.
3. "*Medical Aspects of the Germ Theory.*" Two Lectures by Dr. B. W. Richardson, *Med. Times and Gazette*, Oct. 29th and Nov. 5th, 1870.

The views advanced in the volume, the title of which is at the head of this notice, have been held by Dr. Beale for several years, while the facts upon which they are based have been referred to in various papers and lectures during the past seven years. Dr. Beale declares that although the facts are conclusive as regards the living state of the active matter of contagious disease, he is quite unable to subscribe to the arguments advanced in favour of the *Vegetable* Germ Theory of Disease.

The object of the present volume is to determine the nature of the supposed *germs* to which contagious maladies are now attributed.

In this book Dr. Beale first applies the term *Bioplasm* to what in his other publications he calls *germinal matter*, a substitution which has evidently much to recommend it. The mode of origin and growth of the Bioplasm, and that of the formed material resulting from it, are briefly described in the introduction. After this the subject of vegetable germs is taken up and illustrated, first by the *yeast fungus*, which is described as consisting, under a power of 1000 diams., of distinct *oval bodies*, with bud-like projections subsequently to be detached, *minute particles* (detached germs), and a fluid in which both are suspended. These *germs* and *germules* are composed of a central living *bioplasm*, and external *formed material* constituting a *cell wall*, but originating from the bioplasm only. Many of the germules are less than the $\frac{1}{100000}$ of an inch in diameter; but capable of growing like the parent cell, and giving origin to countless descendants. Most important in this connection, is the fact that these little particles are so protected by the surrounding formed matter from the influence of destructive agents, as to retain their vitality for a great length of time.

These spores are also so light as to be easily transported in the atmosphere, and thus constitute *germs in the air*. Certain of these are figured as magnified by the highest powers. Bodies 100 times heavier than these may be suspended in air. "Hence, it is not to be wondered at, that millions of these should exist almost everywhere; floating in the atmosphere, deposited upon everything, and ready to undergo development wherever the conditions may be favorable." (p. 21.) And though millions be destroyed, a single one may develop under suitable circumstances.

With regard to the *detection* of vegetable germs in the air, this was accomplished more than twenty years ago, and by different methods which are detailed.

Referring to Dr. Tyndall's experiment, in which he confirmed the existence of organic particles in the atmosphere, by proving it to be partially combustible, and also that the same truth may be shown by microscopic examination of the dust of the air, Dr. Beale says, no one would dare to make an assertion that the dust of the air *consists* entirely of disease germs, though remarks have been made in scientific journals which have undoubtedly led the public to believe that such an assertion is intended. Prof. Tyndall is also accused of having led people to suppose, "by his discoveries, surmises, assertions, and predictions published in the '*Times*,' that dust consists of germs, and that air teems with animalcules and disease-producing particles, which is not really the case."

The very *minute vegetable organisms* which may be obtained from the air, or developed in animal and vegetable infusions, are described as being for the most part of an oval form, frequently exhibiting a constriction which corresponds to a point of division. There is, however, no possibility of identifying the different kinds of bioplasmic matter under the microscope. Animal or vegetable, they resemble each other, and they cannot be distinguished from particles of germinal matter derived from the living mucus or pus, or white blood corpuscles of man himself.

Dr. Beale denies heterogenesis—the doctrine that living things proceed from lifeless matter. The experiments of Dr. Child in 1864–65, are detailed. In the fluids, in the examination of which with high powers Dr. Beale assisted, *organisms were found* after the lapse of a variable period. He answers the argument derived from their presence, by the reply that, first, there is nothing to prevent us from coming to the conclusion supported by so many facts that are well known, that the living forms discovered sprang from the *living* matter which *resisted* the high temperature to which they were exposed.

Second, that it does not appear that *every part* of the apparatus of Dr. Child was subjected to the same high temperature. Moreover, we do not know everything concerning the influence of both high and low temperature upon the minute particles of bioplasm constituting the germs of the lowest forms of life. Some organisms live for a length of time imprisoned in solid ice, while there may be organisms which possess the remarkable property of resisting the destructive influence of a temperature of 300° or 350° F., that to which Dr. Charlton Bastian exposed his fluids. Indeed, he considers it more reasonable to suppose that the living forms discovered, arose from pre-existing germs, which obtained access in consequence of the arrangements being not quite perfect, than that they had been formed anew from lifeless matter.

As to the *manner in which vegetable germs might enter the body*, it is alleged that particles so minute could easily pass into the blood through the soft mucous covering of the mouth or stomach, entering these recesses with food and water. They would extend inwards, not as an amœba, but by growth and free multiplication in the substance of the epithelium, as the result of which they would get nearer and nearer the blood which they would finally attain. Here immersed, they would grow and multiply rapidly. Probably there is not a tissue in which these germs are not present, nor is the blood free from them. But as to their *relation to disease*, so long as the higher living matter lives and grows healthfully, the vegetable growths, though they may be, and are present, *they are passive and dormant;* but when changes occur, they become active and multiply. We must conclude, however, that their presence is due to alterations in the fluids *consequent* upon morbid changes; not that they are themselves the cause of disease. Indeed, "they cannot be regarded as the cause of the disease any more than the vultures which devour the carcass of a dead man can be looked upon as the cause of his death."

In the recent paper of Dr. Beale, "On the Real Nature of Disease Germs," after describing the structure, size, and form of disease germs as met with in the simple exudations, in the pus of purulent ophthalmia, gonorrhœal pus, vaccine lymph, variola of fever, syphilitic disease germs, disease germs in the secretions, and finally cancer germs, he concludes as follows:—

"These resemble one another in general appearance. Neither by its form, chemical composition, or other demonstrable properties, could the vaccine germ be distinguished from the smallpox germ, or the pus germ from either. All resemble the minute particles of bioplasm of the blood, from which they have probably been derived; but from which they differ so remarkably in *power*. Concerning the conditions under which these germs are produced, and of the manner in which the rapidly multiplying matter acquires its new and marvellous specific powers, we have much to learn, *but with vegetable organisms the germs have nothing to do. They have originated in man's organism.* Man himself has imposed the conditions favourable to their development. Man alone is responsible for their origin. Human intelligence, energy and self-sacrifice may succeed in extirpating them, and may discover the means of preventing the origin of new forms not now in existence."

These are also nearly the views of Dr. B. W. Richardson, upon the same subject as expressed in two lectures "On the Medical Aspects of the Germ Theory," delivered before the Medical Society of London, and published in the *London Medical Times and Gazette* for Oct. 29th and Nov. 5th. 1870. They are, indeed, the only views in connection with the germ theory, which we consider at all justified by reliable observation and experiment. J. T.

ART. XXIV.—*The Pathology and Treatment of Venereal Diseases: including the Results of recent Investigations upon the Subject.* By FREEMAN J. BUMSTEAD, M.D., Professor of Venereal Diseases at the College of Physicians and Surgeons, New York, etc. etc. Third edition, revised and enlarged. With illustrations. 8vo. pp. 704. Philadelphia: Henry C. Lea, 1870.

PROF. BUMSTEAD'S work is so well known to the profession both abroad and at home, and has so long borne the deserved reputation of being the best treatise on venereal diseases extant in the English language, that the reviewer's task upon the appearance of a third edition might well be limited to a mere announcement of the publication of the volume, no words of commendation being required to secure for it the favourable reception which it is sure to meet with. The whole work, the author tells us in his preface, has undergone a thorough revision, and many additions have been made, the chief of which refer to (1) the treatment of stricture, due attention being given to the operations of rupture and of internal urethrotomy, (2) the subject of visceral syphilis, and (3) that of the syphilitic affections of the eyes, the chapter on the latter subject having been revised by Dr. E. G. Loring, of the Manhattan Eye and Ear Infirmary. A careful inspection of Dr. Bumstead's new edition has satisfied us that the promises of the preface are amply fulfilled in the body of the work, and that the high reputation acquired by previous issues[1] will be worthily maintained by that now offered to the public.

In reading Dr. Bumstead's pages a few points have seemed to us to call for further comment, some of theoretical, some of practical, and some of historical interest; but, in calling attention to them, we beg it to be understood that our criticism is offered in no invidious spirit, and with a full sense of the importance and great value to be attached to any opinion or assertion of the distinguished author. In the first place, we cannot but regret that Dr. Bumstead gives even the very qualified support which he now does to Clerc's view that the chancroid is a derivative of the chancre: this is a question which is to be considered not merely in the light of a few observations made in the practice of syphilization, but of all that is known both of the *natural history* and of the *history* of the two diseases. Indeed we are surprised that Dr. Bumstead does not himself see the inconsistency of devoting, as he does, a number of pages to proving that the chancroid was and the chancre was not known to the ancients, and then admitting even the possibility that the former may be a derivative of the latter: surely the derivative cannot have preceded in time that from which it was derived.

On page 52 we find it asserted that the chancroid is never met with upon the

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[1] We trust it may not be considered unbecoming to refer in this place to the very strong resemblance borne, in some parts, to the early editions of Dr. Bumstead's treatise, by a work on Syphilis, Chancroid, etc. recently published by an Irish surgeon, Dr. J. K. Barton, of Dublin, and which has been very favourably reviewed by numerous critics. This resemblance, which we do not remember to have seen pointed out hitherto, is sufficiently evident on a careful comparison of the two works, and, while we can scarcely believe it to be the result of an accidental coincidence, is, we think, closer than is justified by the not too respectful reference to Dr. Bumstead's labours found in the author's preface.